Memorandum

To:	File	Date:2/14/00
From:	Anne Leggett	File #:07072-144 7.5.8
Subject:	Preliminary Wetlands Analysis	

Introduction

Many options have been defined for improving access between Revillagigedo and Gravina Islands. The potential routes range from some that would leave Revilla Island near Ward Cove to those that would leave Revilla south of downtown Ketchikan; the latter would cross Pennock Island. Options that cross other than right at the airport all include a road paralleling the shore, roughly 1,000 to 3,000 feet inland, from where the crossing lands to the airport. The general project area is depicted on Figures 1a and 1b, but the locations of the various options are not depicted as they are continually being refined. Alternative structures that could improve access include one or a combination of a bridge, a tunnel, and an underwater tube, or enhanced ferry service. The purpose of this memorandum is to identify issues related to wetlands that should be considered as the many options are winnowed down to the most promising alternatives that will be analyzed in an Environmental Impact Statement. A more detailed wetlands analysis will be completed during preparation of the EIS.

Wetlands are specially regulated under the Clean Water Act. They are defined by the Corps of Engineers' implementing regulations as: "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support…a prevalence of vegetation typically adapted for life in saturated soil conditions." More simply put, they are vegetated areas that are water-saturated for a substantial part of the growing season. For the purposes of this discussion, "wetlands" include marshes, muskegs, and stunted forests and do not include other waters such as streams, lakes, or the sea.

A project developed in the U.S. is mandated to avoid and minimize adverse impacts to wetlands to the extent possible. Alternatives must be considered that would not have, or would have lesser, adverse impacts to wetlands. The selection of alternatives for accessing Gravina Island must take into account—among other factors—the project's effects on wetlands.

The U.S. Fish and Wildlife Service, through its National Wetlands Inventory (NWI)

program, has prepared broad-scale maps of wetlands in the Ketchikan area. Those maps show that almost all the lowlands on the Tongass Narrows side of Gravina, as well as most of the land on Pennock Island, is wetland, the only substantial exception being the developed airport area. Some of the potential locations for departure from Revillagigedo Island are also wetland, although they are not mapped by the NWI. No access option other than enhanced ferry operation at the existing location can be constructed without affecting wetlands. Therefore, the next step is to identify wetland-related information that might affect the viability of the various options under consideration and allow initial comparison of those options.

Wetlands perform many important environmental functions, some of which are unique to wetlands. Consideration of wetland functions and values is multi-disciplinary and considers all aspects of the natural environment. Examples of functions are: groundwater recharge or discharge, detention of water and regulation of creek flows, protection of shores against erosion, detention of sediments, detention and processing of pollutants, production of organic carbon that supports ecosystems, and serving as fish and wildlife habitat. Values that humans may derive from wetlands include recreational and subsistence opportunities, open space, clean drinking water, and protection from floods. Which functions and values a particular wetland performs depends on such factors as the wetland's water source, its soil type, its vegetation types, its position on the landscape, and its location relative to other natural and human features. Some of the functions pointed out below relate much more to a particular position on the landscape than to soil saturation levels. For example, the forested beach fringe is important wildlife habitat because of its location adjacent to tidal water, not because its soils are wet.

Methods

For this initial "red flags" analysis of wetland issues, several information sources were used. We reviewed the National Wetlands Inventory maps and stereo coverage of aerial photographs of the entire project area. We reviewed general literature on wetland areas in southeast Alaska and British Columbia. We spoke with regulatory and resource agency staff familiar with the project and familiar with wetlands in the Ketchikan area, and with other researchers and resource managers that work throughout Southeast Alaska. Review of more specific pertinent literature and interviews of resource experts are ongoing. During January 2000, two HDR staff visited the project area and became familiar with the site topography and hydrologic conditions, and with the general wetland types present. Research of the available knowledge base has turned up relatively little information specific to Southeast Alaska wetlands or to the wetlands in the project area. Much of the information presented below has been inferred from what is known about the functions of these wetland types elsewhere.

Findings

Wetland Types

Several wetland types were observed on the ground in Ketchikan and are easily distinguished on aerial photographs:

- Forested wetlands are prominent northeast of the airport and at some of the potential departure points on Revillagigedo Island. They are generally drier than other wetlands, either because they are on topographically higher or steeper sites, or because their substrates drain better internally. They are found, in particular, along larger creeks and as a fringe along the beaches of Gravina and Pennock Islands. They are also interspersed with the "muskeg" wetlands. They are characterized by a mix of conifer species including shore pine, red and yellow cedar, western hemlock, and less Sitka spruce. The trees appear stunted relative to those that are found in a better-drained forest. The understory supports a dense growth of blueberry, huckleberry, rusty menziesia, salal, and an herb ground cover.

- Open, "muskeg"-type wetlands predominate west and south of the airport and on Pennock Island. These open wetlands are intricately interspersed with small patches of forested wetland. The open areas are characterized by low shrub and herb vegetation, such as sweetgale, blueberry, crowberry, and short sedges, and by water pooled on the surface. Typically, wetlands with such vegetation are associated with deep accumulations of peat. However, most of the open wetlands we observed had only a shallow layer of organic matter over a mineral soil. Many of the wetlands were moderately sloped and had water flowing through them. Flowing water, as well as contact between that water and mineral soil, usually leads to a more nutrient-rich and productive biological community. If these wetlands had deep peat, most of them would be categorized as "fens", which are less acidic and more nutrient-rich than "bogs". The term "fen" will be used loosely to describe these areas even though they do not have deep peat accumulations. Some true bogs, with deep deposits of peat and less flowing water, have also been observed within the project area.

- Estuarine meadows exist along the shore of Gravina Island. At elevations near the highest tides, these meadows are dominated by grasses, and sedges and herbs are prominent near the more average high tide elevations. These meadows may be supported by seepage of freshwater out of the beach gravels.

Wetland Functions

Wetlands in the project area perform some ecological functions important enough that they should be considered during selection of access alternatives. Some of these functions are not specific to wetlands.

Estuarine beach meadows are found in protected areas along the shore of Gravina Island, generally associated with a stream. They are highly productive habitats and much organic matter produced within them washes into the marine ecosystem where it supports food webs. The beach meadows are important feeding areas for many terrestrial and aquatic

species of wildlife, including deer, black bear, river otter, mink, shorebirds, waterfowl, and songbirds. They provide succulent forage in spring when other habitat types may be snow-covered. They also serve as nurseries for young fish. Estuarine habitats are considered relatively scarce in Southeast Alaska.

Forested areas form a fringe just inland from the high tide line. On Gravina Island, the trees in these forests are generally larger than in adjacent areas farther inland, probably the result of slightly better drainage. Forested beach fringes—whether wetland or upland—are highly valued throughout Southeast Alaska, primarily for the important habitat they provide. They serve as cover for animals feeding along the beaches. They serve as den sites for terrestrial species like river otter and mink that feed in the marine environment. Bald eagles typically nest in trees in this fringe. If these forested fringes were located downslope from human developments, they would provide a buffer to improve runoff water quality before its discharge into the sea, as well as a visual buffer between that development and the sea.

Numerous streams traverse the project area. Adjacent to these are forests that are generally wetlands. Some of the streams are in steep-sided ravines. South of the airport on Gravina Island, the forested strips are narrower and open wetlands may abut the streams. Most of the functions of these areas relate more to their position next to streams than to their status as very wet sites. Groundwater may be discharged in some of these streamside areas, which is important for maintenance of base flows in the streams. These riparian corridors shade the creeks, provide woody debris that maintains the stream's structure and provides substrate for invertebrates, bind creek banks, and produce other organic matter that washes into the creek to support the aquatic food webs. Riparian areas serve as travel corridors and feeding and resting habitat for many species, such as mink and black bear. Riparian areas along streams that support anadromous fish receive rich nutrient input each year when animals feed upon the fish and scatter their carcasses over the forest floor. The trees in these corridors are among the largest on the east side of Gravina Island. If ground-disturbing activities occurred nearby, the riparian areas could serve as important filters of sediments and other pollutants that might otherwise be discharged into streams.

Other forested wetland areas, not within the beach fringe or a riparian corridor, are prominent south of the airport. Important functions of these wetlands are less well known. They may be groundwater recharge areas and may help regulate stream flows, particularly those forests that have deeper peat accumulations. They likely export dissolved organic matter that supports downstream aquatic ecosystems. They provide habitat for forest-dwelling wildlife like deer, black bear, and breeding Vancouver Canada geese. The forest edges are used by other species, such as certain songbirds. Forested habitat is relatively rare on the lowlands on the east side of Gravina Island but wetland forests are not scarce in Southeast Alaska.

Little is also known about the specific functions of the open, muskeg-type wetlands in the

project area. Agency staff generally thought that, since fens are more productive than bogs, they should be more highly valued. Further discussion indicates that, more specifically, it is the fens dominated by tall sedges that are most productive and important. Winter conditions during the January field visit did not allow distinction among true bogs, short sedge-dominated fens, and tall sedge fens.

Tall sedge fens tend to be found at toes of slopes where groundwater discharges, as well as around the margins of open wetlands and in drainage tracks. They are thought to have the highest nutrient status and be the best aerated and most productive of these three muskeg wetland types. They may support a higher wildlife diversity and abundance. Because they are productive and tend to have water flowing through them, they may export organic material that supports downstream ecosystems and help maintain natural chemistry and low flows in those creeks. These rich fens may be particularly susceptible to disturbance of hydrology resulting from upslope activities. They are considered relatively scarce in Southeast Alaska. The locations of these richer fens may be distinguishable on aerial photographs but further field investigation is needed to confirm that.

Short sedge fens seem to dominate the open wetlands in the project area. These areas probably have less water flowing through them and are not as nutrient-rich as the tall sedge fens. If there are true fens with deep peat accumulations in the project area, the ones nearest creeks would be important for maintaining base flows to those creeks. Organic material produced in these wetlands, particularly in the more sloped wetlands and those nearest streams, probably washes into creeks and supports the food webs of the aquatic system. The less sloped fens would be effective at retaining sediments in the event of ground disturbance. Little is known about wildlife use of these extensive habitats. Deer and black bear are thought to feed in them seasonally, and some shorebirds and passerine species and blue grouse are known to use these areas. Waterfowl may use lakes and ponds. Humans may pick berries there.

True bogs are probably present in the project area. These, too, may be distinguishable on aerial photographs after more field work. These areas have deep peats, are highly acidic, and support plants that can tolerate acidic, nutrient-poor conditions. They are relatively scarce in Southeast Alaska and therefore contribute to biodiversity. The deep peats in these wetlands are usually water-saturated. During periods of little precipitation, they may continue to release water slowly to creeks downstream, thus maintaining low flows. These are not thought to be highly productive wetlands, though they may support certain species of shorebirds and songbirds, as well as deer and black bear.

Recommendations for Alternative Selection

While selecting viable alternatives for Gravina Island access, the following should be considered to help avoid and minimize wetland impacts. These are listed in approximate priority order.

- Choose alternatives with less ground disturbance on Gravina and Pennock Islands.
- Avoid direct disturbance of the estuarine beach meadows and adjacent shorelines and river mouths.
- Minimize disturbance of riparian corridors. Make necessary stream crossings where little ground disturbance will be necessary. If tradeoffs must be made, place top priority on avoiding effects on anadromous fish streams and on streams that drain to protected, shallow, estuarine inlets. (Note that on Figures 1a and 1b, riparian corridors are shown even where the streamside areas are not wetlands.)
- Minimize disturbance of beach fringes. The U.S. Forest Service recommends a 1,000-foot non-disturbance corridor along beaches, with particular reference to forested areas. On Pennock Island and south of the airport, forested habitats do not extend inland 1,000 feet, so maintenance of such a wide corridor may not be appropriate. Figures 1a and 1b depict a 1,000-foot corridor in forested areas, and a corridor approximately as wide as the forest in other areas.
- Avoid disturbance of lakes and ponds and vegetated areas surrounding them.
- Site any road on flatter terrain rather than steeper land. This would minimize the area that must be disturbed and would limit potential adverse water quality and drainage effects.
- Within the generally forested wetland area north of the airport, site initial road alternatives in the most common habitat types. Avoid the forested areas with the largest trees and, once their locations have been identified, minimize siting in true bogs.
- Within the areas dominated by open wetland types (Pennock Island, west and south of the airport on Gravina Island), minimize effects on the less common habitat types; that is, forested areas.

Additional Information Needs

Key resource agency staff have been interviewed regarding wetland functions, and some pertinent literature has been reviewed. References have been made to other scientists and managers that have worked in Southeast wetlands; these people should also be interviewed. A substantial body of literature has been gathered but not yet reviewed. This review should occur so a more detailed analysis of wetland functions can be developed, as well as an evaluation of potential project impacts. Once functions have been better described (to the extent that they are known), that information should be provided to the regulatory and resource agencies and their review and further insights sought. Consensus on the relative importance of different wetland types should be sought, based on the available information. This should be done prior to the field season (by June).

Prediction of any “build” alternative’s impacts on hydrology requires a better understanding of the substrate on which the wetlands have formed. If certain impermeable layers are perching water atop them, disturbance of those layers may have

more wide-reaching effects on hydrology. The questions must be posed to hydrogeologic experts: Is there an impeding layer that has resulted in wetland formation? If so, is that layer likely to be penetrated by road building activities, creating a means of wetland drainage? These questions may be answered based on geotechnical studies already done, or may require additional work. The answers are needed before alternatives' impacts can be described.

Some of the open wetland types may be more valuable than others, specifically the rich fens and the true bogs. Additional field work needs to be done during early summer (June) to locate these wetland types. These areas can probably be distinguished on the aerial photos after more sites are visited on the ground. Vegetation can then be examined more closely than in January, and incidental wildlife observations can be made. Measurements of chemical parameters (pH, conductivity) at representative sites might lend to our understanding of the differences between these wetland types. The access alternatives could then potentially be adjusted to avoid the more important wetlands.

Information Sources Consulted to Date

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Steve Brockman, U.S. Fish and Wildlife Service
Ellen Campbell, U.S. Forest Service, Regional Office
David D'Amore, U.S. Forest Service, Pacific Northwest Research Station, Juneau
Steve Duncan, U.S. Corps of Engineers, Anchorage
Jack Gustafson, Alaska Department of Fish and Game
Chris Iverson, U.S. Forest Service, Regional Office
Patricia Krosse, U.S. Forest Service, Supervisor's Office, Ketchikan
Dennis Landwehr, U.S. Forest Service, Supervisor's Office, Ketchikan
Ralph Thompson, U.S. Corps of Engineers, Juneau

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